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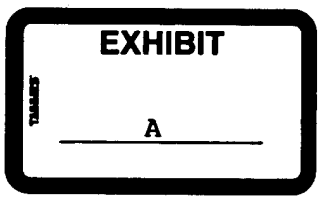
Rudolf Meyer

explosives

2nd, revised and extended edition



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It is prepared by condensation of formaldehyde with nitromethane and by nitration of the nitroisobutylglycerin product under the same conditions as nitroglycerin. The nitration and stabilization procedures are very difficult because of decomposition rections.

While being of interest to the explosives industry, since it has an ideal oxygen balance, its stabilization in actual practice proved to be impossible.

Nitromethane

Nitromethan; nitrométhane; NM

CH_3NO_2

colorless liquid
molecular weight: 61.0
energy of formation: —413.7 kcal/kg = —1731 kJ/kg
enthalpy of formation: —443.1 kcal/kg = —1854 kJ/kg
oxygen balance: —39.3 %
nitrogen percentage: 22.96 %
volume of detonation gases: 1102 l/kg
heat of explosion (H_2O liq.): 138 kcal/kg = 4763 kJ/kg
specific energy: 130 mt/kg = 1275 kJ/kg
density: 1.1385 g/cm³
solidification point: —29 °C = —20 °F
boiling point: 101.2 °C = 214.2 °F
evaporation enthalpy: 151 kcal/kg = 631 kJ/kg
vapor pressure:

millibar	temperature °C	°F
1.3	— 29	— 20 (solidification point)
10	0	32
32	20	68
140	50	122
283	80	176
1010	101.2	214.2 (boiling point)

lead block test: 400 cm³/10 g
detonation velocity, confined:
6290 m/s = 20 700 ft/s at ϱ = 1.138 g/cm³

Nitromethane is sparingly soluble in water. The compound is of interest as a solvent rather than as explosive. Its technical synthesis

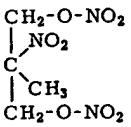
involves nitration of methane with nitric acid above 400 °C (750 °F) in the vapor phase.

It was used in the USA for underground model explosions ("Pre-Gondola"), in preparation for the → *Nuclear Charge* technique. Nitromethane was also employed in stimulation blasting in oil and gas wells. PLX (*P*icatinny *L*iquid *E*xplosive) is a mixture of nitromethane with 5 % ethylene diamine and is foreseen to clean up mine fields.

Nitromethane is of interest both as a monergolic and as a liquid fuel for rockets.

Nitromethylpropanediol Dinitrate

methylnitropropanediol dinitrate; Nitromethylpropandiol-dinitrat; dinitrate de nitromethylpropanediol



gross formula: $C_4H_7N_3O_8$
molecular weight: 225.1
oxygen balance: —24.9 %
nitrogen percentage: 18.67 %
volume of detonation gases: 907 l/kg
heat of explosion (H_2O liq.): 1283 kcal/kg = 5372 kJ/kg
specific energy: 129 mt/kg = 1260 kJ/kg

The product is prepared by condensation of → nitroethane with formaldehyde, after which the nitromethylpropane diol is nitrated.

Nitroparraffins

are aliphatic hydrocarbons with NO_2-groups attached directly to carbon atoms. They are mainly obtained by nitration in a gaseous state; → *Nitromethane; Nitroethane, Trinitromethane; Tetranitromethane.*

Nitroparaffins can be reacted with formaldehyde to obtain nitroalcohols, which can be further esterified with nitric acid (→ e.g., *Nitroisobutylglycerol Trinitrate*).